

- (21) Application No. 7497/74 (22) Filed 19 Feb. 1974  
 (31) Convention Application No's  
       2 314 778 (32) Filed 24 March 1973  
       2 400 883 9 Jan. 1974 in



- (33) Germany (DT)  
 (44) Complete Specification published 15 Dec. 1976  
 (51) INT. CL.<sup>2</sup> D06N 7/04  
 (52) Index at acceptance  
       B2E 189 18Y 207 24Y 319 339 447 44Y 456 515 517 52Y  
       548 549 571 657 65Y 666 708 725 727 73Y 756  
       759 806

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(54) METHOD OF PRODUCING A WATER VAPOUR-  
 PERMEABLE PLASTICS-COATED WALLPAPER OR WALL  
 COVERING AND A WALLPAPER OR WALL COVERING  
 PRODUCED BY SUCH A METHOD

- (71) We, PICKHARDT & SIEBERT, a GMBH organised and existing under the laws of the Federal Republic of Germany, of 527, Gummersbach, Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 10 This invention relates to a method of producing a water vapour-permeable plastics-coated wallpaper or wall covering, and a wallpaper or wall covering produced by such a method.
- 15 It has been proposed that wallpaper or wall coverings may be produced by a process in which a thermoplastic material in monomeric form or as a solution is applied in a thin layer to a web of paper or fleece, and hardened. This treatment can be repeated several times so that a plurality of layers of the thermoplastic material is formed on the paper or fleece.
- 25 Another method of producing wallpaper or wall coverings has been proposed, in which a freshly extruded film of a thermoplastic material which is still in a thermoplastic state, is joined under pressure to a web of paper or fleece. The separate use of an adhesive is in this case unnecessary.
- 30 The surface of the plastics coating on the wallpapers or wall coverings produced in this way can then be subjected to conventional finishing treatments aimed for example at forming a high-gloss or matt finish on the surface of the plastics coating. The surfaces of the plastics coating on the wallpapers or wall coverings may also be provided with coloured patterns, while it is also possible to impart to the plastics coating a surface structure of a relief-like nature.
- 40 One advantage of these plastics-coated wallpapers or wall coverings is their increased durability and washability compared with wall coverings made from paper or flat textile structures alone.
- 50 However, a disadvantage of such coated wallpapers or wall coverings is that they have extremely low permeability to water vapour, or are even totally impermeable thereto. In consequence of the property, such plastics-coated wallpapers or wall coverings can be attached to a wall surface to be covered, only with special and out-of-the-ordinary adhesives, and these adhesives must generally also contain an increased proportion of fungicidal media in order to prevent fungoid attack on the wall surface. When these plastics-coated wallpapers or wall coverings are applied to a wall surface which, as for example in new buildings, may have an elevated moisture content, the wallpaper or wall covering constitutes a considerable obstruction to the evaporation of this moisture.
- 60 According to the present invention, there is provided a method of producing a water vapour-permeable plastics-coated wallpaper or wall covering, wherein plastics material is applied in monomeric form or as a solution to a web of paper or fleece and the plastics material is hardened to form a coating on the web, the plastics coating having perforations which are formed by the dispersion in said plastics material of water in an amount of from 1 to 5% by weight of said plastics material.
- 75 Such a method can be employed to produce any wallpapers or wall coverings which have a continuous plastics coating on a paper or fleece web. Preferably, however, the wallpapers or wall coverings produced by the method according to the invention are those which comprise a paper or fleece web coated with one or more layers of a thermoplastic material, such as polyvinyl-chloride and/or polyester resins, which are firmly bonded to the paper or fleece.
- 80 It will be seen therefore that permeability of the plastics coating is achieved by dispers-
- 90

ing water in the plastics material which is to be applied to the paper or fleece web in liquid monomeric form or in a solution of the plastics material, prior to such application and hardening, the amount of water being from 1 to 5% by weight of the plastics material. Preferably, the amount of water is from 1.5 to 3% by weight.

The water can be rapidly and evenly dispersed into the fluid plastics monomer or in the solution of plastics material by a suitable dispersion means. If even dispersion of the water is not possible by employing such means, then conventional emulsifiers may be a valuable aid, being added either to the liquid or dissolved plastics material or to the water, in suitable quantities. In any case, the product of the mixture should be a water-in-oil emulsion which has adequate stability for it to be applied to the web of paper or fleece without breaking. Instead, the emulsion should also be stable right into the initial phases of the hardening process. Only during further hardening of the plastics phase of the coating produced by the water-in-oil emulsion on the paper or fleece web should the water diffuse out of the coating, leaving open pores in the applied coating.

Prior to complete hardening of the plastics coating of the wallpaper or wall covering the plastics layers thereof can also be treated and/or provided with patterns according to conventionally employed industrial processes.

The wallpapers and wall coverings produced by a method according to the invention have many times greater permeability to steam than a plastics-coated wallpaper or wall covering produced in otherwise identical fashion on a paper or fleece web, but without the addition of water as described in greater detail below.

When plastics-coated wallpapers or wall coverings produced by a method as specifically described below are stuck to a supporting surface, for example a wall, with conventional water-based adhesives, drying of these adhesives is completed in not more than 24 hours, whereas in the case of an otherwise identically constructed plastics-coated wallpaper or wall covering which does not have a perforated plastics coating, even after more than 40 hours there is still no substantial reduction in the water content of the layer of adhesive.

Plastics-coated wallpapers or wall coverings produced by a method according to the invention as described below can be processed in generally the same ways as conventional wallpapers, without becoming detached from the wall during the course of the drying process, possibly with the formation of bubbles, for example in new buildings with a high moisture content in

their walls, and the supporting surface on which these products according to the invention are stuck does not generally suffer from fungal attack. The wallpapers or wall coverings of the invention are also washable.

An example of a method according to the invention will now be specifically described.

#### Example 1

A polyvinylchloride paste consisting of 60 parts by weight of polyvinylchloride, 40 parts by weight of softener of a phthalic acid ester type, 10 to 20 parts by weight of filler and pigment and 2 parts by weight of stabiliser, was stirred together with 2% by weight of water and the resultant emulsion was applied in a coating thickness of approximately 100 to 200  $\mu$  onto a web of paper which was then passed through a gelling duct at a temperature of 200 to 220°C. The conditions for gelling and hardening of the plastics material was such that the aqueous phase evaporates evenly out of the coating which forms, once this has partially solidified but not completely hardened.

After hardening of the coating of plastics material, a test strip was cut off, coated with a conventional wallpaper paste and applied with the coating of paste onto a glass plate. The edges of the test strip was securely stuck with a self-adhesive foil which lay half on the glass plate and half on the surface of the test strip. In this case, the amount of water present in the paste was regarded as the quantity of water which had to evaporate, and this amount was taken as equal to 100%. The sample thus treated was kept for 30 hours under normal conditions of temperature, pressure and humidity. After this time, the sample had lost 80% of the water in the paste, due to evaporation to the ambient atmosphere. Thus, with the present test strip dimensions, it was calculated that the water vapour permeability of the plastics coating of the test strip was equivalent to water evaporation of 130 g/sq.m. over a period of 24 hours.

#### Example 2 (Comparative example)

A plastics-coated wallpaper was produced as indicated in Example 1 but without the addition of water in the coating mixture; the remainder of the coating mixture and the web of paper, and the mode of operation, were otherwise identical to Example 1. A test strip of this plastics-coated wallpaper was subjected to the same test conditions as the sample in Example 1. After 30 hours' storage of this sample under the conditions indicated in Example 1, it was found that this sample had lost only a negligibly small part of the moisture in the paste. The water vapour permeability of this sample corresponded to approximately 30 g/sq.m. over a period of 24 hours.

## WHAT WE CLAIM IS:—

1. A method of producing a water vapour-permeable plastics-coated wallpaper or wall covering, wherein plastics material is applied in monomeric form or as a solution to a web of paper or fleece and the plastics material is hardened to form a coating on the web, the plastics coating having perforations which are formed by the dispersion in said plastics material of water in an amount of from 1 to 5% by weight of said plastics material.
2. A method according to claim 1 wherein said amount of water is from 1.5 to 3% by weight of said plastics material.
3. A method according to claim 1, substantially as hereinbefore described with reference to Example 1.
4. A wall paper or wall covering when produced by a method according to any one of the preceding claims.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1976.  
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.